UNIVERSITI SAINS MALAYSIA

First Semester Examination
[Peperiksaan Semester Pertama]

Academic Session 2008/2009
[Sidang Akademik 2008/2009]

November 2008

CPT111 – Principles of Programming
[Prinsip Pengaturcaraan]

Duration : 2 hours
[Masa : 2 jam]

INSTRUCTIONS TO CANDIDATE:
[ARAHAN KEPADA CALON:]

- Please ensure that this examination paper contains **THREE** questions in **SEVENTEEN** printed pages before you begin the examination.

  *[Sila pastikan bahawa kertas peperiksaan ini mengandungi **TIGA** soalan di dalam **TUJUH BELAS** muka surat yang bercetak sebelum anda memulakan peperiksaan ini.]*

- Answer **ALL** questions.

  *[Jawab **SEMUA** soalan.]*

- You may answer the questions either in English or in Bahasa Malaysia.

  [Anda dibenarkan menjawab soalan sama ada dalam Bahasa Inggeris atau Bahasa Malaysia.]

1. (a) Mark the following statements as **True** or **False**:

(i) Given:

```
cout  << " Good " ;
      << "Morning!" << endl;
```

The statement prints `Good Morning!`

(ii) Given:

```
int number=200;
if (number>=300)
cout << "LARGE NUMBER\n";
else
cout << "SMALL NUMBER\n";
cout << number;
```

The statement prints `LARGE NUMBER`

(iii) The following is a legal C++ program.

```
int main ()
{
return 0;

}
```

(iv) If `a=5;` and `b=10;` then after the statement `a=b;` the value of `b` is still `10`.

(v) Given:

```
for (int j = 1; j <= 12; j++)
   for (int k = 1; k >= (j+12); k--)
        cout << '*';
        cout << j << endl;
```

The program prints 12 lines of output.

(5/100)

(b) What is the output of each of the following program segments?

(i)
```
cin >> a;
cin.ignore (20, '\n');
cin >> b;
cout << a << endl;
cout << b << endl;
```

The input for the above program is given as follows:
120 45 244 34 56
1230 56 34

(ii)
```
cin >> age;
cin.get(ch);
getline(cin,name);

cout << "Age: " << age <<endl;
cout << "Name: " << name;
```

The input for the above program is given as follows:
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Nik Maryam

(iii)
```
int num=62 ;
int solution =num%4 ;
if (solution== 0)
cout << "Num is " << num;
else
cout << "Num is " << num+2;
```

(iv)
```
int j=10;
j=j+20;
cout << ++j << endl;
cout << j << endl;
cout << j++ << endl;
cout << j << endl;
cout << j++;
```

(15/100)

(c) Suppose x, y, z, and w are `int` variables. What value is assigned to each of these variables after the execution of the last statement?

```
x = 8; z = 2;
y = x - z;
z = 3 * y + 3;
w = x + x/4 + z;
z += w - x;
```

(10/100)

2. (a) State and correct the error(s) for the following questions:

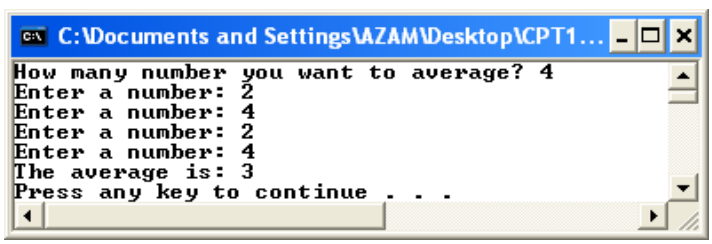
(i) The following statement should determine if x has a value other than 3 or 5.

```
if ( x!= 3 || x >=5)
```

(ii) The following program segment should find the average for a set of numbers.

```
int main()
   {
      int numCount,total,average;
      cout << "How many number you want to average? ";
      cin >> numCount;
      for (int count =0; count < numCount; count++)
         {
            int num;
            cout << "Enter a number: ";
            cin >> num;
            total +=num;
            count++;
         }
      average = total /count;
      cout << "The average is: " << average << endl;
      system("pause");
      return 0;
   }
```

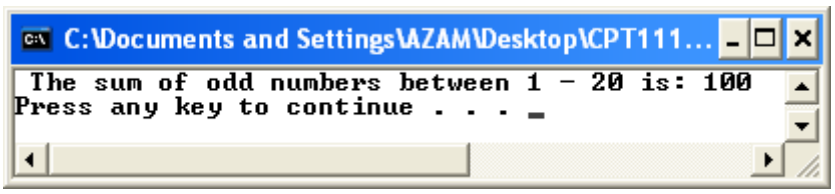
The following is the sample input and output of the program:



(iii) The following program displays the sum of odd numbers between 1 - 20 (inclusive).

```
int main()
{
   int count = 1; total;
   do {
      total = total + count;
   } while (count <20)
count << "The sum of number 1 – 10 is: " ;
cout << total << endl;
return 0
   }
```

The following is the sample output of the program:

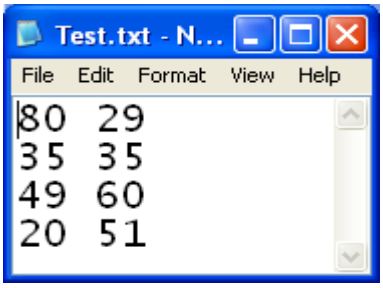


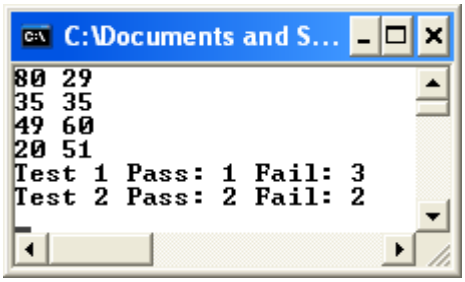
(9/100)

(b) You are to write a program to read data from a text file named `Test.txt` until at the end of the text file. The read values are stored in variables `test1` and `test2`. You are required to test if there is an error while opening the text file. Finally you have to determine total number of students who failed and passed `test1` and `test2` given that the passing mark is 50 and above. Given the following incomplete program:

```
int main () {
   ifstream inData;
   float test1=0, test2=0;
   int pass_test1=0,fail_test1=0,pass_test2=0,fail_test2=0;
   inData.open ("Test.txt");
   inData >> test1 >> test2;
   total1=total1 + test1;
   total2=total2 + test2;
   cout <<"Test 1 "<<"Pass: "<< pass_test1 <<" ";
   cout <<"Fail: "<< fail_test1<< endl;
   cout << "Test 2 "<<"Pass: "<< pass_test2 <<" ";
   cout <<"Fail: "<< fail_test2<< endl;
   inData.close();
   return 0;
 }
```

The following are the sample of the text file and output of the program.





(i) State **two** (**2**) errors or problems which will arise for the given program.

(ii) Write a complete program to perform the given task.

(15/100)

(c) (i) How many stars will be displayed for the following program segment?

```
for (int x = 0; x < 12; x++)
   {
      for (int y=0; y < 25; y ++)
         cout << "*" << endl;
   }
```

(ii) Given the following program segment:

```
int main() {
int count=0, input=0;
cout << "Enter an integer input: ";
cin >> input;
while (count < 5)
         {
   if ((input % 2) != 0)
   {
      for (int x = 0; x <= (input % 2); x++)
      cout << "*";
      cout << endl;
   }
   else
   cout << "*" << endl;
   count= count + 2;
   }
return 0;
}
```

Give the output of the program for each of the following inputs:

- 10
- 13

(6/100)

3. (a) What are the outputs for each of the following programs?

(i)
```
#include <iostream>
using namespace std;

int main ()
{
   void change1 (int[]);
   void change2 (int *);
   void change3 (int, int, int, int, int);
   void change4 (int&, int&, int&, int&, int&);
   void print (int[]);
   int t[5] = {0};

   print (t);
   change1 (t);
   print (t);
   change2 (t);
   print (t);
   change3 (t[0],t[1],t[2],t[3],t[4]);
   print (t);
   change4 (t[0],t[1],t[2],t[3],t[4]);
   print (t);
}

void change1 (int s[])
{
   for (int i=0; i < 5; i++)
      s[i] = i * 2;
}

void change2 (int *s)
{
   for (int i=0; i < 5; i++)
      s[i] += 7;
}

void change3 (int a, int b, int c, int d, int e)
{
   a = a + 4;
   b = b + a;
   c = c + 5;
   d = d + b;
   e = e + 3;
}
```

```
void change4 (int &a, int &b, int &c, int &d, int &e)
{
   a++;
   b--;
   c++;
   d--;
   e++;
}

void print (int s[])
{
   for (int i=0; i < 5; i++)
      cout << s[i] << "\t";
   cout << endl;
}
```

(5/100)

(ii)
```
#include <iostream>
#include <string>

using namespace std;

void mystery (char *, char *);
void sayWhat(char *);

int main()
{
   char str1[20] = "GooD";  char  str2[25] = "lUcK";
   sayWhat(str1);
   sayWhat(str2);
   cout<<str1<<endl;
   cout<<str2<<endl;
   mystery(str1, str2);
   sayWhat(str1);
   cout<<str1;
}

void sayWhat(char *s)
{
   int x, len;

   len = strlen(s);
   for(x=0; x<len; x++, s++)
   {
      if(islower(*s))
         *s = toupper(*s);
      else
         *s = tolower(*s);
   }
}
```

```
void  mystery(char *s1, char *s2)
{
   while (*s1++);
   s1--;
   while (*s1++ = *s2++);
}
```

(5/100)

(b) Design a program to analyse the results of the recent by-election results, which includes 28 voting centres; P1, P2, …, P28 and 3 candidates; `PKR`, `BN`, and `PAS`. Candidates will loose their deposits if their total number of votes is less than 10% of the overall total of votes. All the functions in this program receive all the arrays as parameters.

(i) Declare a one-dimensional array `Centres` to store the number of registered voters in each centre. Declare **three** (**3**) one-dimensional arrays for each candidates; `PKR`, `BN`, and `PAS` to store the amount of voters for each candidate at every centre.

(4/100)

(ii) Write a value-returning function `Winner` that will calculates the total number of voters for each candidate and returns the name of the winner.

(7/100)

(iii) Write a void function `Deposit` that will determine which candidates lost their deposits and prints their name. If no candidates lost their deposits, then display appropriate message.

(7/100)

(iv) Write a function `TurnUp` that will find and display the centres that have the number of turn up higher than the average turn up. This function uses reference parameters `HighTurnUp`, `LowTurnUp`, and `AvgTurnUp` to return the values of the highest turn up, lowest turn up and the average turn up back to the main program. (Turn up means the percentage of voters actually voted compared to the number of registered voters).

(7/100)

1. (a) Tandakan kenyataan-kenyataan di bawah sama ada **Benar** atau **Salah**:

(i) Diberi:

```
cout  << " Good " ;
      << "Morning!" << endl;
```

Kenyataan yang dicetak ialah `Good Morning!`

(ii) Diberi:

```
int number=200;
if (number>=300)
cout << "LARGE NUMBER\n";
else
cout << "SMALL NUMBER\n";
cout << number;
```

Kenyataan yang dicetak ialah `LARGE NUMBER`

(iii) Berikut adalah kenyataan yang benar tentang atur cara C++.

```
int main ()
{
return 0;

}
```

(iv) Jika `a=5;` dan `b=10;` selepas kenyataan `a=b;` nilai `b` tetap `10`.

(v) Diberi:

```
for (int j = 1; j <= 12; j++)
   for (int k = 1; k >= (j+12); k--)
        cout << '*';
        cout << j << endl;
```

Atur cara ini akan mencetak 12 baris output.

(5/100)

(b) Apakah output untuk setiap keratan atur cara di bawah.

(i)
```
cin >> a;
cin.ignore (20, '\n');
cin >> b;
cout << a << endl;
cout << b << endl;
```

Input bagi atur cara di atas adalah seperti yang berikut:
120 45 244 34 56
1230 56 34

(ii)
```
cin >> age;
cin.get(ch);
getline(cin,name);

cout << "Age: " << age <<endl;
cout << "Name: " << name;
```

Input bagi atur cara di atas adalah seperti yang berikut:
33
Nik Maryam

(iii)
```
int num=62 ;
int solution =num%4 ;
if (solution== 0)
cout << "Num is " << num;
else
cout << "Num is " << num+2;
```

(iv)
```
int j=10;
j=j+20;
cout << ++j << endl;
cout << j << endl;
cout << j++ << endl;
cout << j << endl;
cout << j++;
```

(15/100)

(c) Jika x, y, z, dan w adalah pemboleh ubah jenis int. Apakah nilai-nilai yang dimasukkan ke dalam pemboleh ubah x, y, z dan w selepas kenyataan terakhir dijalankan?

```
x = 8; z = 2;
y = x - z;
z = 3 * y + 3;
w = x + x/4 + z;
z += w - x;
```

(10/100)

2. (a) Nyata dan betulkan ralat (-ralat) untuk soalan-soalan berikut:

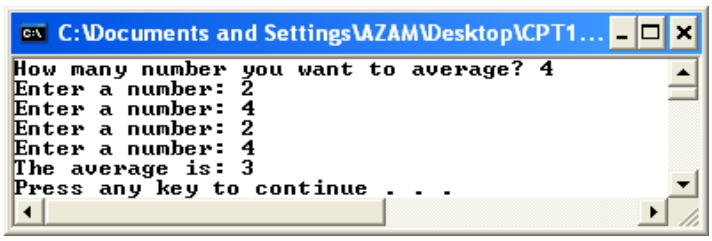
(i) Kenyataan berikut perlu menentukan jika x mempunyai nilai selain 3 atau 5.

```
if ( x!= 3 || x >=5)
```

(ii) Keratan atur cara berikut perlu mencari purata untuk satu set nombor.

```
int main()
   {
      int numCount,total,average;
      cout << "How many number you want to average? ";
      cin >> numCount;
      for (int count =0; count < numCount; count++)
         {
            cout << "Enter a number: ";
            cin >> num;
            total +=num;
            count++;
         }
      average = total /count;
      cout << "The average is: " << average << endl;
      system("pause");
      return 0;
   }
```

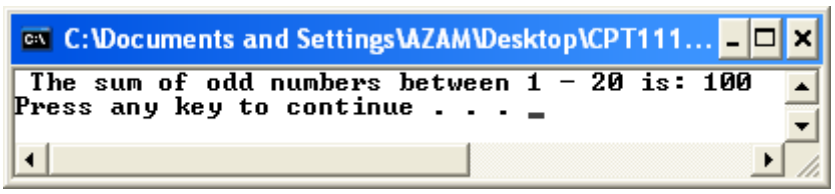
Berikut adalah sampel input dan output atur cara berkenaan:



(iii) Atur cara berikut memaparkan jumlah nombor-nombor ganjil di antara 1 - 20 (termasuk 1 dan 20).

```
int main()
{
   int count = 1; total;
   do {
      total = total + count;
   } while (count <20)
count << “The sum of number 1 – 10 is: “ ;
cout << total << endl;
return 0
   }
```

Berikut adalah sampel output atur cara:

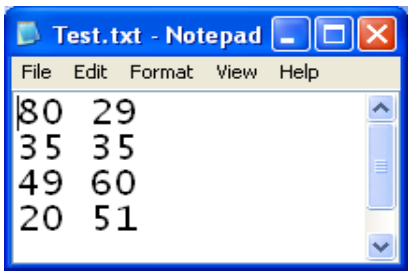


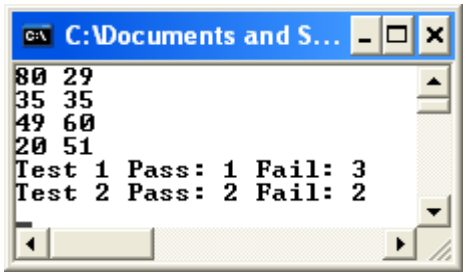
(9/100)

(b) Anda dikehendaki menulis suatu atur cara untuk membaca data dari fail teks bernama `Test.txt` sehingga akhir fail teks. Nilai-nilai yang dibaca disimpan dalam pemboleh ubah `test1` dan `test2`. Anda dikehendaki menguji sekiranya terdapat ralat semasa membuka fail teks tersebut. Akhirnya anda perlu menentukan jumlah pelajar yang telah gagal dan lulus untuk `test1` dan `test2` jika markah lulus adalah 50 dan ke atas. Diberikan atur cara berikut yang tidak lengkap.

```
int main () {
   ifstream inData;
   float test1=0, test2=0;
   int pass_test1=0,fail_test1=0,pass_test2=0,fail_test2=0;
   inData.open ("Test.txt");
   inData >> test1 >> test2;
   total1=total1 + test1;
   total2=total2 + test2;
   cout <<"Test 1 "<<"Pass: "<< pass_test1 <<" ";
   cout <<"Fail: "<< fail_test1<< endl;
   cout << "Test 2 "<<"Pass: "<< pass_test2 <<" ";
   cout <<"Fail: "<< fail_test2<< endl;
   inData.close();
   return 0;
 }
```

Berikut adalah sampel fail teks dan output atur cara.





(i) Nyatakan ralat atau masalah yang akan timbul semasa membaca fail teks untuk atur cara yang diberikan.

(ii) Tulis atur cara lengkap untuk melaksanakan tugas berkenaan.

(15/100)

(c) (i) Berapa banyak bintang-bintang akan dipaparkan dalam keratan atur cara berikut?

```
for (int x = 0; x < 12; x++)
   {
      for (int y=0; y < 25; y ++)
         cout << "*" << endl;
   }
```

(ii) Diberi keratan atur cara berikut:

```
int main() {
int count=0, input=0;
cout << "Enter an integer input: ";
cin >> input;
while (count < 5)
        {
   if ((input % 2) != 0)
   {
      for (int x = 0; x <= (input % 2); x++)
      cout << "*";
      cout << endl;
   }
   else
   cout << "*" << endl;
   count= count + 2;
   }
return 0;
}
```

Berikan output bagi atur cara berkenaan bagi setiap input berikut:

- 10
- 13

(6/100)

3. (a) Apakah output bagi setiap atur cara berikut?

(i)
```
#include <iostream>
using namespace std;

int main ()
{
   void change1 (int[]);
   void change2 (int *);
   void change3 (int, int, int, int, int);
   void change4 (int&, int&, int&, int&, int&);
   void print (int[]);
   int t[5] = {0};

   print (t);
   change1 (t);
   print (t);
   change2 (t);
   print (t);
   change3 (t[0],t[1],t[2],t[3],t[4]);
   print (t);
   change4 (t[0],t[1],t[2],t[3],t[4]);
   print (t);
}

void change1 (int s[])
{
   for (int i=0; i < 5; i++)
      s[i] = i * 2;
}

void change2 (int *s)
{
   for (int i=0; i < 5; i++)
      s[i] += 7;
}

void change3 (int a, int b, int c, int d, int e)
{
   a = a + 4;
   b = b + a;
   c = c + 5;
   d = d + b;
   e = e + 3;
}
```

```
void change4 (int &a, int &b, int &c, int &d, int &e)
{
   a++;
   b--;
   c++;
   d--;
   e++;
}

void print (int s[])
{
   for (int i=0; i < 5; i++)
      cout << s[i] << "\t";
   cout << endl;
}
```

(5/100)

(ii)
```
#include <iostream>
#include <string>

using namespace std;

void mystery (char *, char *);
void sayWhat(char *);

int main()
{
   char str1[20] = "GooD";  char  str2[25] = "lUcK";
   sayWhat(str1);
   sayWhat(str2);
   cout<<str1<<endl;
   cout<<str2<<endl;
   mystery(str1, str2);
   sayWhat(str1);
   cout<<str1;
}

void sayWhat(char *s)
{
   int x, len;

   len = strlen(s);
   for(x=0; x<len; x++, s++)
   {
      if(islower(*s))
         *s = toupper(*s);
      else
         *s = tolower(*s);
   }
}
```

```
void  mystery(char *s1, char *s2)
{
   while (*s1++);
   s1--;
   while (*s1++ = *s2++);
}
```

(5/100)

(b) Reka bentukkan atur cara untuk menganalisis keputusan pilihan raya kecil baru-baru ini, yang merangkumi 28 pusat mengundi: P1, P2, … P28 dan 3 calon iaitu `PKR`, `BN`, dan `PAS`. Calon akan hilang wang pertaruhan jika jumlah bilangan undian yang diterima oleh mereka kurang 10% daripada jumlah keseluruhan undian. Semua fungsi dalam atur cara ini menerima semua tatasusunan sebagai parameter.

(i) Isytihar tatasusunan satu-dimensi `Centres` untuk menyimpan bilangan pengundi yang berdaftar pada setiap pusat. Isytihar **tiga** (**3**) tatasusunan satu-dimensi bagi setiap calon; `PKR`, `BN`, dan `PAS` untuk menyimpan bilangan undian calon tersebut di setiap pusat.

(4/100)

(ii) Tulis fungsi yang memulangkan nilai `Winner` yang akan mengira jumlah bilangan undian bagi setiap calon dan mengembalikan nama pemenang.

(7/100)

(iii) Tulis fungsi berjenis `void Deposit` yang akan menentukan calon mana yang kehilangan wang pertaruhan dan mencetak nama mereka. Jika tiada calon yang kehilangan wang pertaruhan, maka cetak mesej yang sesuai.

(7/100)

(iv) Tulis fungsi `TurnUp` yang akan mencari dan memapar pusat yang mempunyai bilangan kehadiran yang melebihi purata kehadiran. Fungsi ini menggunakan parameter rujukan `HighTurnUp`, `LowTurnUp`, and `AvgTurnUp` untuk kembalikan nilai kehadiran tertinggi, kehadiran terendah dan purata kehadiran kepada atur cara main. (Kehadiran bermaksud peratusan pengundi yang mengundi berbanding bilangan pengundi yang berdaftar).

(7/100)